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HOLDER THAT CAN BE ASSEMBLED  
[Samenstelbare houder]

Henk Dekkers

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INVENTOR	(72):	Henk Dekkers
APPLICANT	(71):	Wavin B. V. te Zwolle
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The invention relates to a holder that can be constructed by stacking on each other a bottom element that involves at least one wall part and a wall element that has walls to be connected with the bottom element, where the bottom element can be connected with the wall element by means of several tongues and recesses constituting parts of the bottom element and the wall element that together form connections and locking devices that are present to unlock the connections so that the wall element and the bottom element can be released.

/1\*

Such a holder is known from the German laid-open patent application 4 037 696.

This publication describes a holder of the given type to be constructed from several elements, where the elements can be joined with each other by means of snap-in connections and where means can be present for unlocking the snap-in connections so that the different elements can be removed from each other.

The present invention offers a holder of the above type, where the elements are coupled in each other with connections that do have a snap-on nature but where the snap-in connection function is used as desired.

For this purpose, the holder according to the present invention is characterized in that the tongues are located on the bottom element and/or the wall element such that the protuberance on a tongue for the formation of a connection lies free in the point of departure of the tongue from the wall part of the bottom element or the wall of the wall element when the bottom element and the wall element are stacked on each other and the locking devices are formed by a device that can make the protuberance of one or more tongues collaborate with the corresponding recess and that for locking can lie against the body surface of the one or more tongues and can be removed therefrom for unlocking.

/2

By designing the tongues that can be placed on the bottom element or on the wall element and that can also be alternatively located with a protuberance on the tongue that lies free of the wall part of the

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\* [Numbers in right margin indicate pagination of the original text.]

bottom element or the wall of the wall element in the point of departure during the stacking and by providing locking devices to be operated separately that can serve for the formation of a connection of the snap-in type by forcing one or more tongues from the point of departure to the connecting position or can facilitate by removal therefrom the unlocking of the connection, a great degree of freedom is created that makes the holder suitable for very different purposes.

As stated in DE-A-4 037 696, the wall element can be collapsible in the holder according to the invention by the presence of suitably located hinges that connect the walls of the wall element and subdivide into collapsible units.

The collapsibility is appropriately realized in such a case so that a collapsed wall element can be accommodated in the space furnished by a bottom element.

The bottom element can be formed of a bottom plate with a wall part around it; the wall part can be extended in the direction of the upper limit of the furnished holder; the wall part can also extend in the downward direction.

What is stated in the present invention description on a tongue should be understood to be valid equally for the aspect or movement for all the other tongues that constitute the holder.

In particular, the holder according to the invention is designed so that for one or more tongues of the bottom element or the wall element a locking device is present in the form of a springing rod that is fastened so that with the stacking of the elements on each other through the pressure of the one or more tongues, the protuberances of which are provided with a suitable bevel, it is moved out of its point of departure until a counterforce is exceeded that is greater than the resistance to bending perpendicular to the body surface of the tongue whereby the tongue is bent so that its protuberance collaborates with a corresponding recess in a wall or wall part during the simultaneous return to the original position of the

/3

rod involved, which then lies against the surface of the body of the tongue turned away from the protuberance and the tongue locks against decoupling of the bond formed.

Due to the presence of a locking device in the form of a rod, whereby the rod with preferably several tongues can effect a very simple locking and unlocking action, where through counteracting the resistance to bending of the tongues and the restoring force of the springing rod an extremely simple joining action can be conducted.

For example, the rod can have a relatively high degree of rigidity and with the aid of spring means can be fastened on the wall, in which recesses are also found. In the stacking of, e.g., a wall element on the bottom element, the tongues with the protuberances on them should press against the rod and move it out of its original position until a certain force is exceeded; this force should then be greater than the resistance to bending perpendicular to the body surface of the tongues when the rod lies against the bevels on the protuberance of the tongues. The required spring force of the suspension of the rod in relation to the resistance of sagging of the tongue is simply determined experimentally.

In particular, the holder according to the invention is of rectangular form while at least two sides of the bottom element or the wall element of it are provided with two tongues or recesses each for forming connections and for each two tongues a flexible rod is present that is longer than the distance between the tongues, is fastened on the wall element or the bottom element in which the recesses are located, with which the protuberances on the tongues can collaborate and whereby the fastening has support points. /4

This implementation form is chosen for a flexible rod and by which accordingly the restoring force is not determined by the properties of the springing means on which the rod is suspended but by the elasticity of the rod itself. The rod is also fastened on the wall element or bottom element in which the

recesses are located, in which the protuberances or the tongues can be accommodated for the formation of a connection; the fastening of the rod involves support points.

In an attractive implementation form, the support points are placed between each of the ends of the flexible rod and a tongue present there. In particular, the length of a flexible rod in the said implementation form is such that the parts of it that extend outside the support points during bending of the rod from the original position extend at least partially outside the limit there in the height direction of the bottom part or the wall part.

This implementation form has the advantage that during the unlocking action the end of the rod extending above the upper limit of, e.g., a bottom part, exerts a pressing force on the wall element or bottom element located there.

Of course, a contact surface is provided on the wall or the wall part in the form of a boss or the like to be able to exert such a pressing force.

The holder according to the invention is appropriately produced of plastic; suitable plastic types are polypropylene, polyethylene, etc.

/5

In the implementation of the holder previously described, the rod during bending out of the original position extends at least partially outside the limit there in the height of the wall part of the bottom element or the wall of the wall element. This is of course not absolutely necessary; the element on which pressure must be exerted by the ends of the rod can also be provided over the wall, in which the recesses are located, by projecting bosses that are fastened on the loosely to be pressed element and against which the ends of the rod come to rest during the unlocking. In this manner, a pressure can be exerted on the loosely coupled element by which it springs loose during the unlocking action.

In a very attractive implementation, the holder, as previously indicated, is rectangular and there are always on two opposite sides two combinations of tongues and recesses for the formation of a

connection and a rod is present for each two joining possibilities on one side. In the unlocking, two opposite rods can be moved with two hands of an operating person by which unlocking occurs and the ends of rods handle an active pushing open of the section to be removed.

Of course the holder according to the invention can involve several wall elements instead of one wall element, which are to be connected together in the same manner as the bottom element and a wall element stacked thereon.

In an unusually attractive implementation form of the holder according to the invention, the bottom element and the wall element or the wall elements are double-walled at least in the area of the connections to be formed while an opening is present between two connections in the outer wall for permitting an unlocking action with the rod. The rod can be relatively rigid on the one hand, where it is suspended on springing means; the rod can also be flexible, whereby the suspension of the rod is on points or support. /6

It is appropriate that if the rod is a flexible one, it involves polypropylene reinforced with fiber glass.

The invention will now be elucidated with reference to the drawing, in which:

Figures 1A, B and C respectively schematically show the locked state of two elements of a holder according to the invention and the unlocked state and the state during locking.

Figure 2 shows two elements that are unlocked by the action of a rod.

Figure 3 shows the situation of Figure 2 schematically and in perspective view.

It is shown in Figure 1A schematically and in cross section that two elements 2 and 3, e.g., a wall part of a bottom element and a wall of a wall element, are joined with each other. The protuberance 6 of the tongue 5 is accommodated in a corresponding recess 7 in the wall 2. The tongue is locked by the rod 8, which is clamped between the body of the tongue 5 and the opposite wall of the double-walled section 2.

The situation from Figure 1A is shown in Figure 1B immediately after an unlocking. The rod 8 is bent downward, by which the tongue 5 can spring back to its original position which is such that the boss 6 lies free of the wall 2 in which the recess 7 is located.

Figure 1C shows the situation that arises during the locking action. The element 3 with the tongue 5 located on it, which is in the original position, is moved downward, whereby the bevel 6b that is present on the said boss 6 comes in contact with the rod 8 and pushes it downward. As soon as the force that will bring the rod 8 back to its original position (called the restoring force here) and that is the result of either the spring force of the springs on which the rod is suspended or the elasticity of the rod itself is greater than the resistance against bending of the tongue 5, the latter will give and lie with the protuberance 6 in the recess 7. Appropriately, as indicated with 2a, the wall of the element in which the recess is located is provided with a bevel to effect a secure guide for the tongue 5 in stacking the elements on each other. /7

The holder in the figure composed of a bottom element and a wall element according to the invention is produced of, e.g., polypropylene and can serve as storage or transport crates. The holder according to the invention is obviously usable for many purposes.

The situation of Figure 1B is shown in aspect in Figure 2; however, here a rod that is fastened on points of support 9 is used, where the rod 8 extends outside the said points of support. The parts of the rod 8 outside the points of support 9 and turned away from the recesses 7 press with their ends during the unlocking action against the element 4, by which it comes loose from the bottom element 1 shown here. The wall part 2 of the bottom element 1 is also double-walled here; an opening through which the rod 8 is accessible for the unlocking action is indicated by 10.

During the unlocking action, the protuberances 6 of the tongues 5 are released from the recesses 7 that are present in the wall of the wall part 2.



Various reinforcement ribs are indicated in the Figure by 11; at the level of, e.g., recesses 7, they take care of the required reinforcement of the wall part 2 and the outer and inner walls of wall part 2 and the outer and inner walls of wall 4 can be present locally as reinforcements extending from the inner to the outer walls.

Figure 3 shows in schematic and perspective view a holder that consists of a bottom element 1 with a wall part 2 that can be joined with a wall element with walls 4. The wall element is collapsible here; of course it can also be a noncollapsible wall element. The opening 10 in the wall part 2 for operating the flexible rod 8 is shown. /8

1. Holder that can be constructed by stacking on each other a bottom element (1) that involves at least one wall part (2) and a wall element (3) to be connected with the bottom element (1) and which involves walls (4) where the connection of the bottom element (1) and the wall element (3) can be effected by means of several tongues (5) and recesses (7) constituting part of the bottom element and the wall element, which together form connections, and locking devices are present to unlock the connections so that release of the wall element (3) and the bottom element (1) can occur, characterized in that the tongues (5) are applied on the bottom element (1) and the wall element (3) so that the protuberance (6) present for the formation of a connection on each tongue (5) in the original position of the tongue (5) lies free of the wall part of the bottom element (2) and the wall of the wall element (3) when the bottom element (1) and the wall element (3) are stacked on each other and the locking means are formed by a device that make the protuberance (6) of one or more tongues (5) collaborate with the corresponding recesses (7) and for locking can lie against the body surface of the one or more tongues (5) and can be removed from there for unlocking.

2. Holder according to Claim 1 characterized in that for one or more tongues (5) of the bottom element (1) and the wall element (3), a locking device is present in the form of a spring-mounted rod (8) that is fastened so that during the stacking of the elements on each other by pressing on one or more tongues (5), the protuberances (6) that are provided with a suitable bevel are moved out of their original position until a restoring force is exceeded that is greater than the resistance to bending perpendicular to the body surface of the or each tongue (5) by which the or each tongue (5) is bent so that its protuberance (6) collaborates with a corresponding recess (7) in a wall or wall part during the simultaneous return to the original position of the rod present (8), which then lies against the surface of

the body of the or each tongue (5) turned away from the protuberance (6) and locks the or each tongue (5) against decoupling of the connection formed.

3. Holder according to Claims 1-2, characterized in that the holder has a rectangular form and at least two opposite sides of the bottom element (1) and its wall element (3) are provided each with at least two tongues (5) and recesses (7) for forming connections and for each at least two tongues a flexible rod (8) is present, which is longer than the maximum distance between the tongues (5) of one side which is fastened on the wall element (3) or the bottom element (1) in which the recesses (7) are located, with which the protuberance (6) on the tongues (5) can collaborate and where the fastening of the rod (8) involves points of support (9).

4. Holder according to Claim 3, characterized in that the points of support (9) are placed between each of the ends of the flexible rod (8) and a tongue (5) present there.

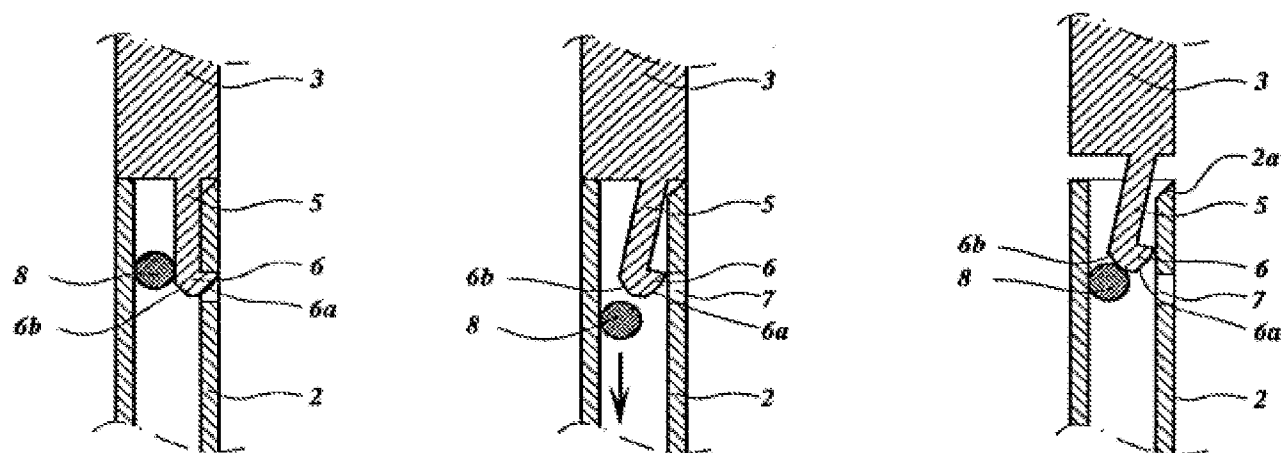
5. Holder according to Claims 3-4, characterized in that the length of a flexible rod (8) is such that the parts of it that extend outside the points of support (9) during the bending of the rod (8) from the original position extend at least partially outside the limit there in the height of the wall part (2) of the bottom element (1) and the wall (4) of the wall element (3).

6. Holder according to one or more of the preceding claims, characterized in that it involves several wall elements (3) that are to be connected with each other in the same manner as the bottom element (1) and the wall element (3).

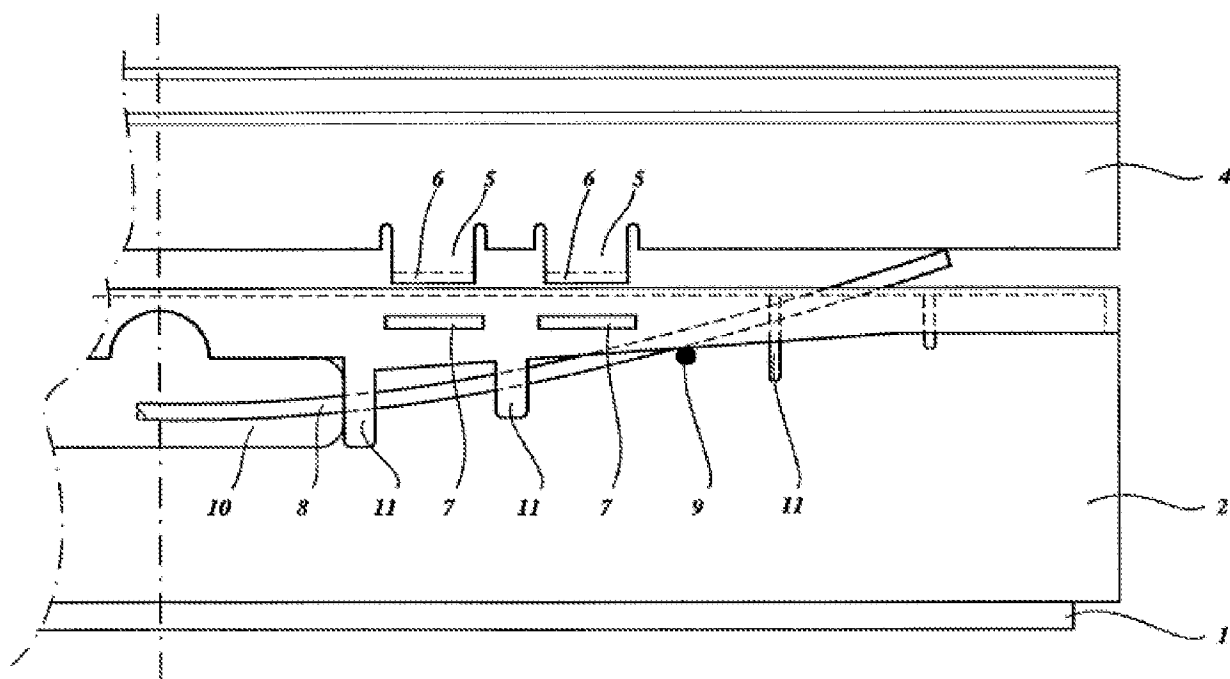
7. Holder according to Claims 2-6, characterized in that the bottom element (1) and the wall element (3) or the wall elements (3) are double-walled at least in the region of the connections to be formed and an opening (10) is present between two connections in the outer wall to permit an unlocking action with the rod (8).

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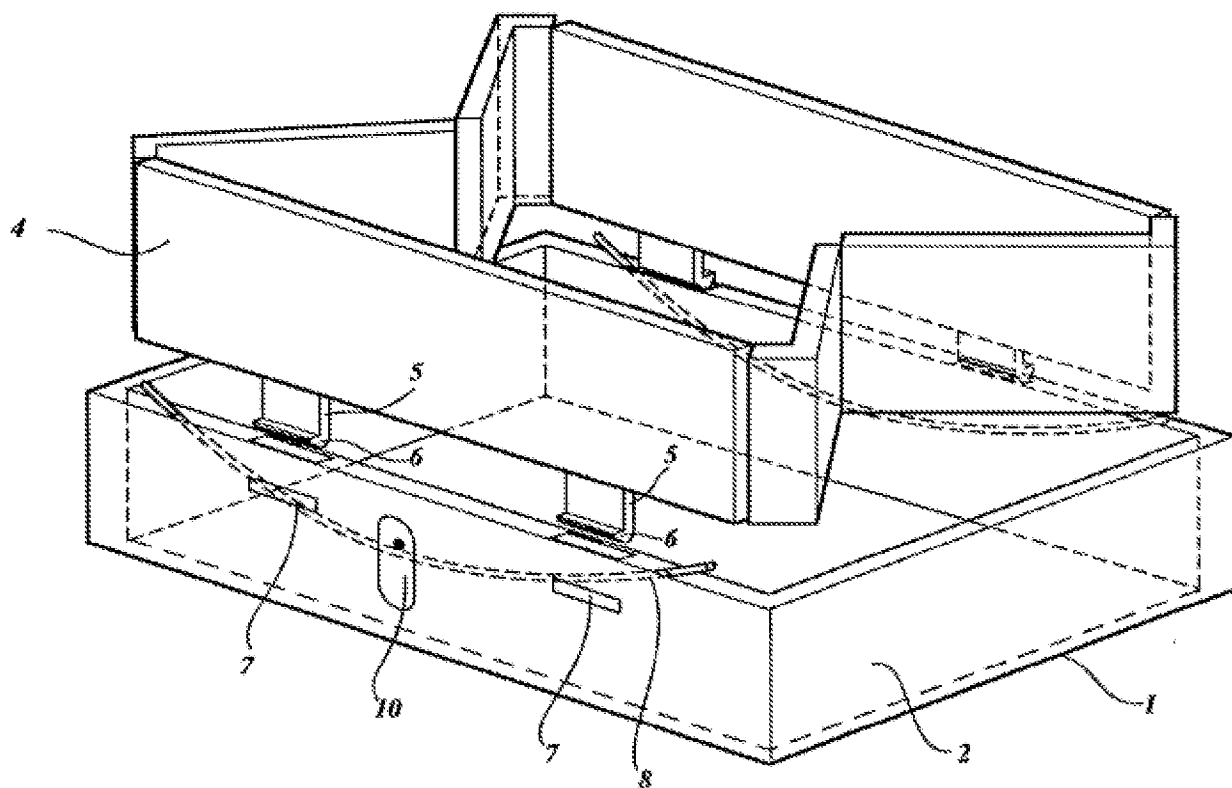
8. Holder according to Claims 3-7, characterized in that the flexible rod (8) includes glass fiber reinforce polypropylene.



**Fig. 1**



**Fig. 2**



**Fig. 3**